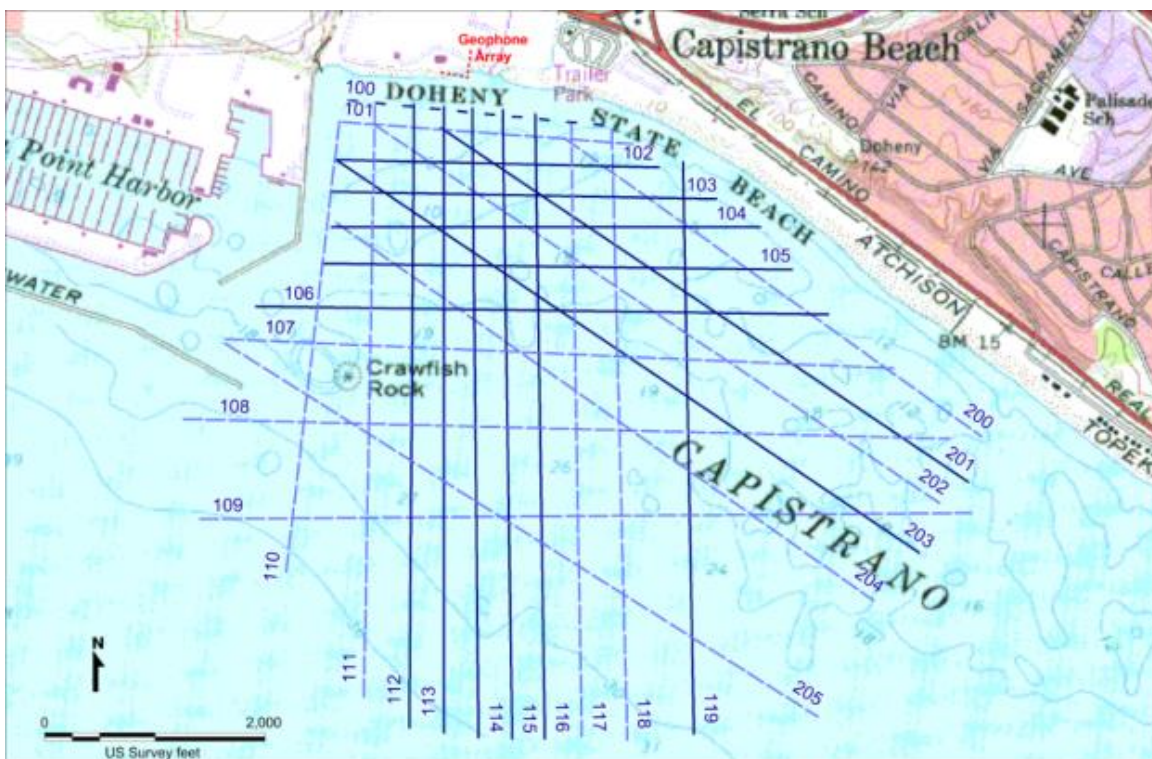


GEOPHYSICAL SURVEY OFFSHORE OF DANA POINT, CALIFORNIA

Field Operations Report



Submitted to:

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GEOPHYSICAL SURVEY OFFSHORE OF DANA POINT, CALIFORNIA

Field Operations Report

1.0 INTRODUCTION

EcoSystems Management Associates, Inc. (ECO-M), a subsidiary of Coastal Environments (CE) conducted an offshore geophysical survey offshore of Dana Point, California on 14 June 2016, to determine the boundaries of the offshore San Juan paleo-river channel seaward of Doheny State Beach. Operations were conducted from the survey vessel 'JAB', a 2010 Armstrong marine aluminum catamaran.

The survey area occurred offshore and adjacent to San Juan Creek in Dana Point, California. Survey operations were conducted from just beyond the surf zone to about 6000 feet (ft) (0.6 miles) offshore and approximately 2500 ft (0.47 miles) alongshore offshore and imaged the sub-bottom geology to depths exceeding 200 feet. The survey was not completed, 10 of the 26 originally planned survey lines were completed. These 10 lines were 10 of the 13 priority lines (Figure 1-1).

Equipment included the following:

1. 300 Joule Boomer system, including the Boomer Control Box and towed sonographic delivery system;
2. Geometric CNT-2 controller data-acquisition system with nominal 240-channel recording capability;
3. 24-channel, high-resolution GeoEel™ digital streamer hydrophone array;
4. Trimble GPS antenna and differential GPS receiver.

The data were acquired with a 300-joule "boomer" acoustic source towed at a depth of 0.3-m (1-ft) below the sea surface. A 24-channel GeoEel™ high-resolution digital streamer with a group interval of 1.56-m (5.12-ft) recorded the reflected acoustic wave energy at a sampling interval of 0.25-ms for a record length of 1000 samples equal to 0.25 sec (250-ms). Common Depth Point (CDP) processing will be applied to the data to provide digital seismic images for interpretation on a workstation using the Geographix™ software.

1.1 PERMITTING: CA STATE LANDS COMMISSION

Prior to the geophysical survey work, ECO-M acquired the necessary permit from the California State Lands Commission (Permit # PRC 8536.9). As per permit requirements, a Marine Wildlife Contingency Plan was prepared and a marine mammal observer was present during the surveys to assure that marine mammals were not harmed by the low energy sonic pulses generated by the geophysical survey equipment. Mammal observations that were carried out during the surveys determined when survey activities should be altered or stopped to avoid interaction with marine mammals. A copy of the Marine Mammal Observer Report during the survey (14 June 2016) is in Appendix A. Additionally, all parties identified in Exhibit C of the permit were sent notification of the geophysical survey activity.

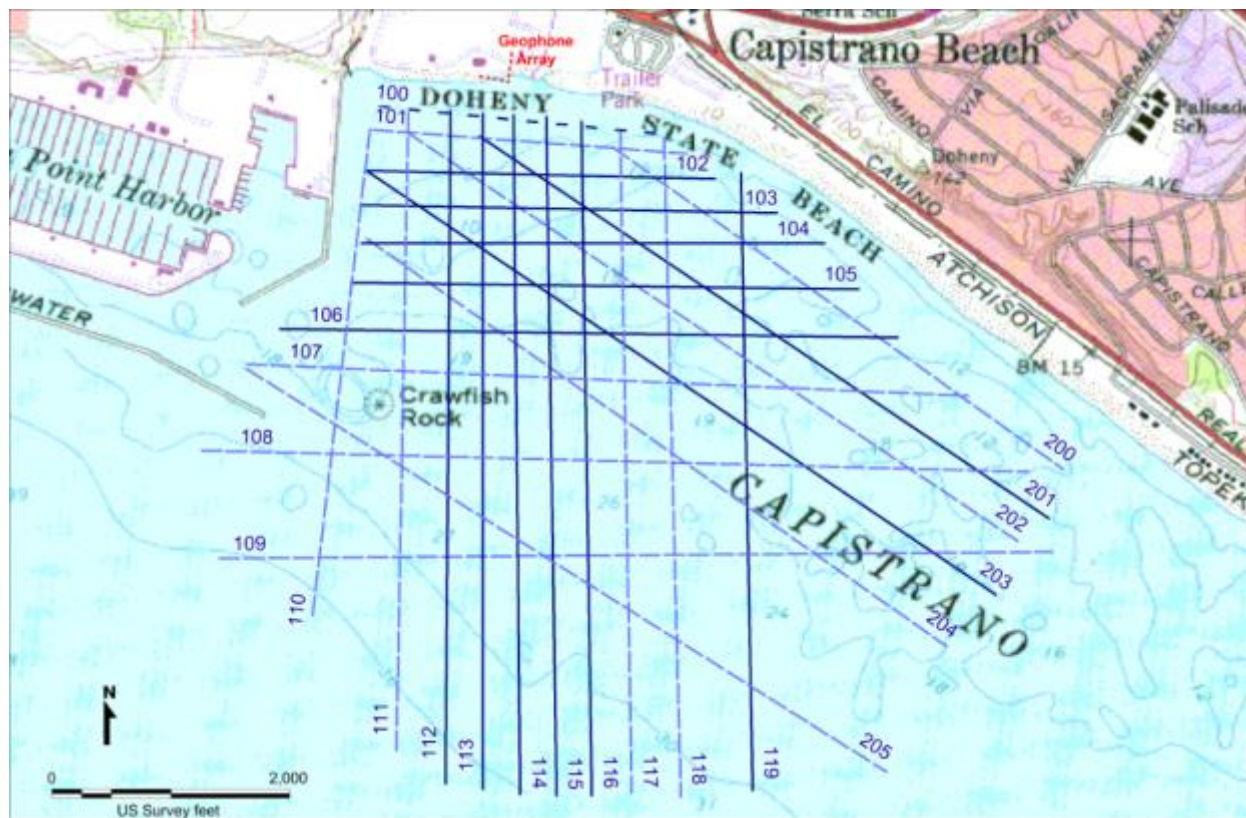


Figure 1-1. Map showing location of the originally proposed geophysical survey offshore of Dana Point, Orange County, CA. A nautical chart serves as a background map, and shows the full area of coverage. The blue solid lines indicate the 13 priority tracklines, the blue dashed lines indicate the 13 secondary priority tracklines. In total there were 26 proposed tracklines and 13 secondary priority tracklines, which were only to be surveyed depending on weather and time.

2.0 SURVEY METHODS AND INSTRUMENTATION

2.1 GEOPHYSICAL SURVEY DATE

The survey was conducted on June 14th 2016 to determine the boundaries of the offshore San Juan paleo-river channel seaward of Doheny State Beach.

2.2 SURVEY VESSEL

Operations were conducted from the survey vessel 'JAB', a 2010 Armstrong marine aluminum catamaran. The vessel was equipped with the following primary equipment for execution of the survey:

1. 300 Joule Boomer system, including the Boomer Control Box and towed sonographic delivery system;
2. Geometric CNT-2 controller data-acquisition system with nominal 240-channel recording capability;
3. 24-channel, high-resolution GeoEel™ digital streamer hydrophone array; Trimble GPS antenna and differential GPS receiver.

2.3 GEOPHYSICAL SURVEY

The survey conducted on the afternoon of June 14, 2016, covered the area from beyond the surf zone to about 6000 feet offshore and imaged the sub-bottom geology to depths exceeding 200 feet. We recorded the seismic reflection data to at least 200 milliseconds two-way travel time. Because seismic reflection profiling measures the subsurface geological reflections in time (two-way travel time – down and back), it is necessary to have information on the sub-bottom seismic velocity. Multichannel seismic profiling obtains that information from the differential travel times to the offset hydrophone groups in the streamer. The seismic velocity structure is also useful for interpreting lithology. Geological ground truth from wells or boreholes is still required, however, to confirm interpretation of subsurface geology from seismic images.

A total of about 11 km of data for ten (10) profiles were acquired along three orientations – five (5) east-west parallel to shore near the San Juan Creek, three (3) northwest-southeast parallel to the shore along Capistrano Beach, and two (2) north-south perpendicular to the shore at Doheny Beach (Map). Some profiles consist of multiple pieces (2) because of interruptions requiring course changes due to heavy swell. The data were acquired with a 300-joule “boomer” acoustic source towed at a depth of 0.3-m (1-ft) below the sea surface. A 24-channel GeoEel™ high-resolution digital streamer with a group interval of 1.56-m (5.12-ft) recorded the reflected acoustic wave energy at a sampling interval of 0.25-ms for a record length of 1000 samples equal to 0.25 sec (250-ms). Common Depth Point (CDP) processing will be applied to the data to provide digital seismic images for interpretation on a workstation using the Geographix™ software. Both stacked and migrated seismic profiles will be produced for interpretation.

Data quality was established in the field during acquisition by monitoring data being recorded by the digital data acquisition system and by preliminary seismic data processing aboard the boat (Profiles DNP-101 and DNP-103). The software used for digital recording of the seismic reflection trace data allow display of shot records and some quantitative measures of acoustic signal and noise levels. The Vista™ seismic data processing software was also used on a laptop computer in the field to examine shot records and perform preliminary data processing, including brute stacking (DNP-101), to insure that data are suitable for interpretation to the target depths and cover the area of interest. Single-channel monitor records from the data acquisition system (DNP-103) were also prepared to show data quality and allow preliminary geological interpretation so that any prominent subsurface features identified may be specifically targeted in subsequent tracklines, including extension of the line if necessary. Once underway, it is easy to extend a line for a few hundred feet at minimal cost in time and effort.

2.4 DATA ACQUISITION AND INSTRUMENTATION

2.4.1 GPS Positioning

A differential Global Positioning Satellite (GPS) navigation system was used to record the shot points at precisely one-second intervals during acquisition. The differential system used ties to the Coast Guard maintained permanent GPS base station in the area. Nominal GPS position accuracy is about 10 meters, and with differential technique, we achieved sub-meter position accuracy (< 3-ft). The shot point navigation (geographic coordinates) during acquisition was based upon the World Geodetic System of 1984 (WGS84) and were converted to the California State Plane Coordinate System, zone 6, North American Datum of 1983 (NAD83), in feet. Shot point positions were determined by adding corrections for the layback or acoustic source distance behind the GPS antenna on the boat

2.4.2 300 Joule Boomer system and 24-channel GeoEel™ Hydrophone streamer

The profiling system consisted of a 300-joule boomer acoustic source and a 24-channel GeoEel hydrophone streamer with group interval of 1.56-m (5-ft). The multichannel system is shown in Figure 2-1. The boomer source is capable of producing acoustic energy pulses with frequency bandwidth up to about 1,000-Hz, but considering spatial aliasing due to back-scattered acoustic energy in the water column, it normally provides useful bandwidth to about 500-Hz with a short streamer group interval. The final processed seismic profiles were filtered to a bandwidth of 72-640 Hz. At a typical compressional wave velocity in water-saturated sediments of about 1,520 m/s (5,000 ft/s), the sub-bottom resolution achieved is about 1.5-m (5-ft) for half wavelength events or about 0.6-m (2-ft) considering “tuning” effects.



Figure 2-1. High-resolution multichannel seismic equipment: Above left is the 300-Joule Boomer in Tow; Above Right is the 16-channel GeoEel digital mini-streamer (24-channel version proposed effort). Below is a view of the equipment deployed for a survey offshore Santa Cruz, California. The boomer sled is in the mid-foreground and the streamer tail buoy is the white object in the right center.

Table 2-1. Trackline GPS coordinates for the offshore Dana Point geophysical survey on 14 June 2016

Date	Line	Lat Start	Long Start	Lat End	Lat End
6/14/2016	DNP101	33.4596277	-117.679507	33.4603848	-117.682910
6/14/2016	DNP102	33.4595020	-117.683621	33.4594803	-117.679199
6/14/2016	DNP103	33.4588639	-117.679012	33.4589970	-117.684105
6/14/2016	DNP104	33.4580855	-117.683602	33.4580705	-117.678298
6/14/2016	DNP108	33.4529384	-117.680276	33.4529551	-117.670926
6/14/2016	DNP114	33.4582272	-117.684522	33.4433191	-117.684092
6/14/2016	DNP116	33.4452695	-117.682263	33.4586610	-117.682695
6/14/2016	DNP116A	33.459654	-117.682753	33.452832	-117.682549
6/14/2016	DNP201	33.4581291	-117.681288	33.4551468	-117.675905
6/14/2016	DNP201A	33.4553098	-117.675953	33.4508735	-117.668973
6/14/2016	DNP202	33.4520321	-117.671977	33.4588180	-117.684316
6/14/2016	DNP203	33.4498001	-117.670631	33.4577700	-117.685153

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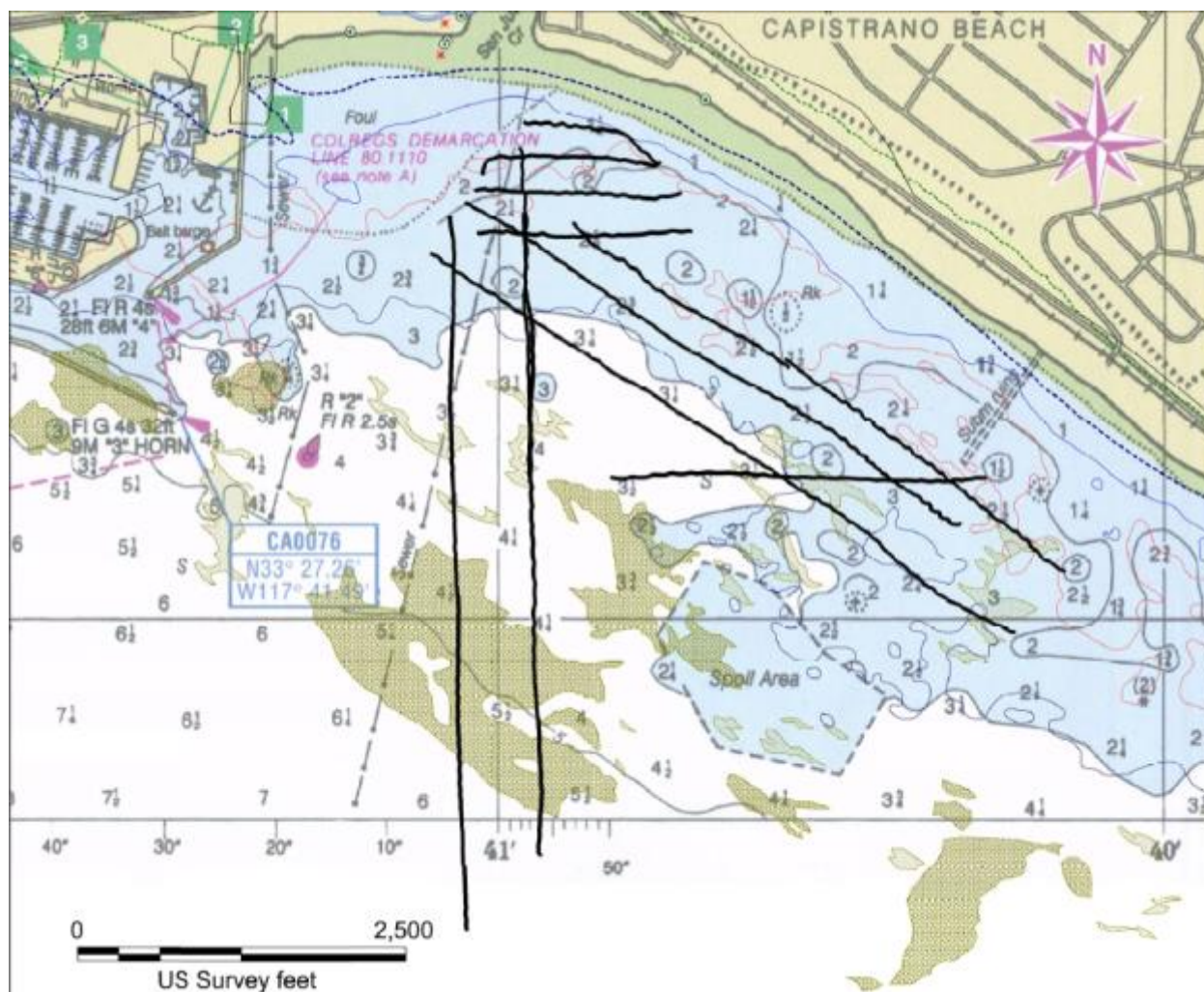


Figure 2-2. Map showing the locations of the tracklines for the offshore Dana Point geophysical survey on 14 June to 2016.

2.5 DATA PROCESSING

2.5.1 Data Processing

Data processing was based on the Common-Depth-Point (CDP) wavelet processing method using the commercial seismic data processing program Vista™ (vers. 10) for 2-D seismic reflection data. Processing steps included: trace editing to remove spikes, band-pass filtering to avoid aliasing, spiking deconvolution to shape the zero-phase wavelet, spherical divergence correction to account for wavefront spreading, trace scaling to account for source variability, normal-moveout (NMO) correction using a stacking velocity of 5,000 ft/s, stacking sorted CDP records, and FK migration at 4,800 ft/s to sharpen the image. Static corrections were applied to account for depth of acoustic source and streamer, and remove the tidal elevation. For shallow subsurface marine seismic data, brute stacks at a constant velocity of 5,000 ft/sec provided good seismic images. Velocity analysis at several locations along key profiles (lines 104 and 203) were performed to provide more seismic velocity structure needed for time-to-depth conversion. The results of the velocity analysis showed that a constant velocity of 5,000 ft/sec (1,520 m/s) was valid for stacking the data at the shallow depths of interest. Post-stack migration of the seismic data using the frequency-wave number method with a constant velocity of 4,800 ft/sec (1,463 m/s) provided a sharper image of subsurface structure by collapsing diffractions and moving dipping reflectors to more accurate positions. The processed seismic data products include both stacked and migrated SEG-Y format data files that were loaded into the workstation for interpretation. Printed copies of seismic profiles saved as pdf files were used for quality control during processing and for plots in the survey report.

3.0 RESULTS

The results of the seismic profiles for selected transects are shown in Figures 3-1 through 3-3. Daily field logs are found in Tables 3-1 and 3-2. Profile DNP-103 is a single-channel monitor record that shows the data quality achieved in the field without any data processing except for band-pass filtering. Profile DNP-101 is a “Brute” stack of the data using the CDP data processing method and shows excellent data quality to almost 200-ms two-way travel time (> 500 feet subsea). A strong reflective sequence exists at about 50-ms two-way travel time (about 125-150 feet subsea).

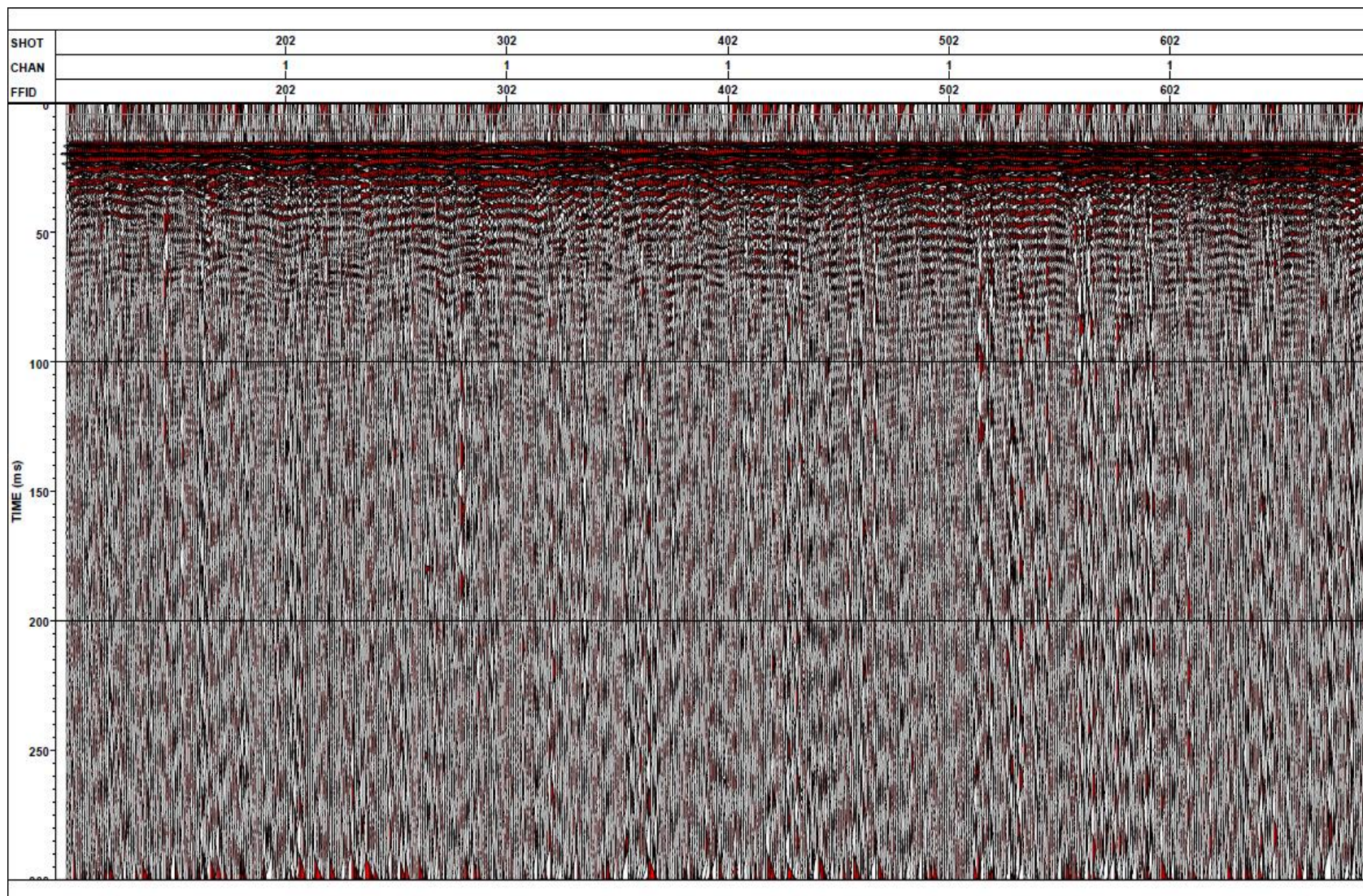


Figure 3-1. Single-channel Q/C plot of line DNP-103.

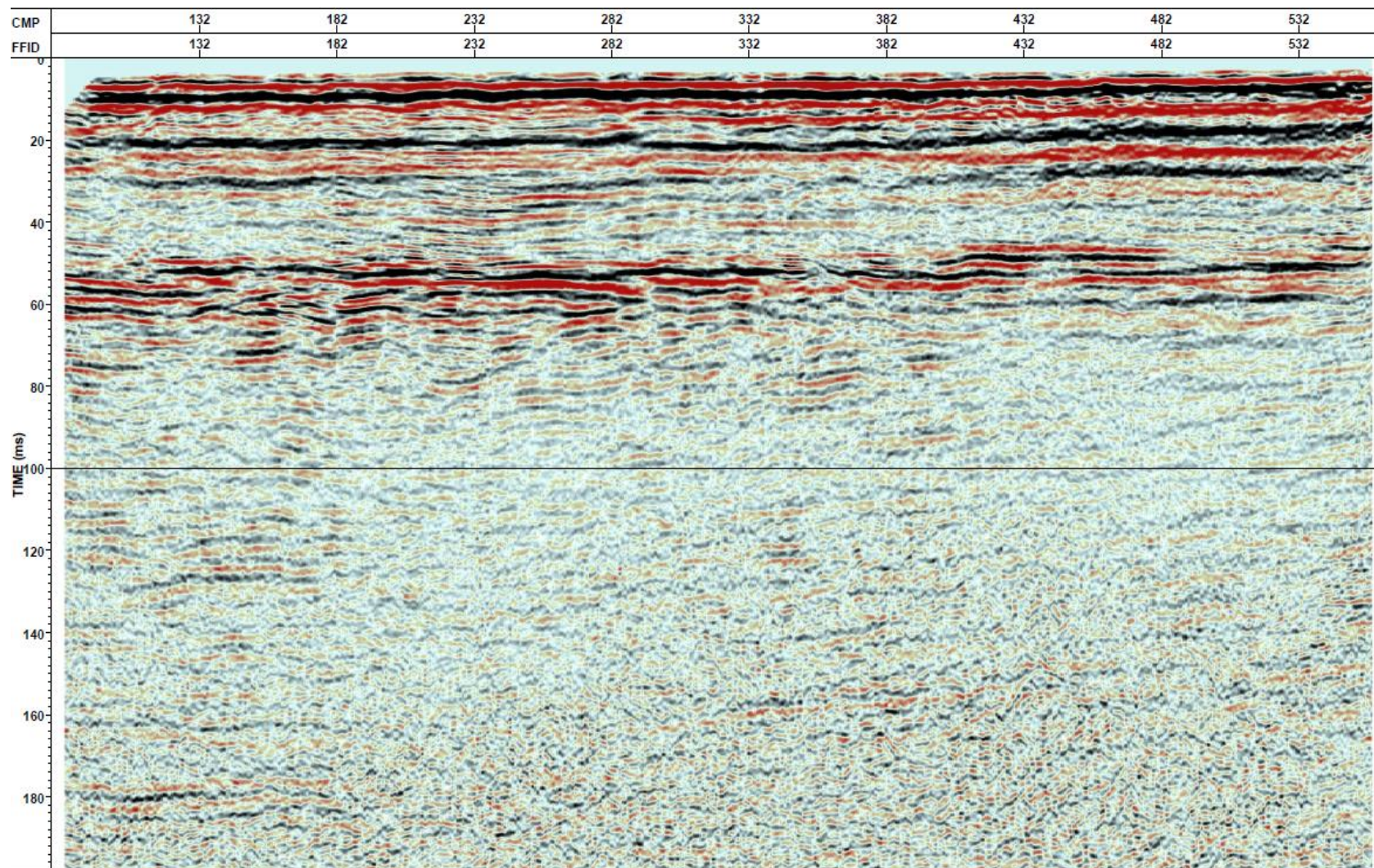


Figure 3-2. A fully stacked and migrated version of line DNP-101.

Table 3-1. Field log/observers report for 14 June 2016

FIELD LOG / OBSERVERS REPORT										Page 1	
Vessel: JAB										Client: Legg Geo	
										Date: 6/14/2016	
Area and / or Block: Dana Point, CA										Line number: see below	
Operator / Observer: D. Bowlus										see below	
Instrumentation											
Source type	Source power	Pre amp gain	Number of	Guns	Plates	Sleeves	Source depth	Other			
Boomer	300 joules	18 db			1		0.3 m	10ms Source Delay			
Sample Int.		Record Length		No. of channels		Cable depth: 0.3 m.					
Primary	0.3 ms.	300 msec.		24		Signature Hydrophone depth					
Secondary	ms.	Sec.				Note: no aux channels recorded					
Filter		Filter		60 HZ Notch		Other		Cable layout			
Low	Slope	High	Slope	Out							
Out		Out									
Recording Instruments	Type	Format		Tape Drives		Far TR No.		Far offset			
	Geo-Eel	SEG Y(IBM)		Hard Disk		24		42.13 m.			
Navigation System	Primary	Secondary		Near TR No.		Near offset					
	Terra Sync			1		6.25 m.					
Boat speed	Navigation fix interval		Group Interval		Shooting Interval						
4 Knots			1.56 m		0.75 m						
File Name	Time UTC	File Number	Speed Rep Rate	Cable depth Meters	Remarks (Changes in weather, sea state, operator, record delays, problems, etc.)						
					24CH GeoEel Streamer, 1.56m Group Interval						
					CH1:8 - SN: 0507-005						
					CH9:16 - SN: 0507-006						
					CH17:24 - SN: 0507-007						
Note: Only time tag should be used from SEG Y file navigation data. Position data should be taken from TerraSync											
					Computer Date reading 7/12/2016 with time ahead by 1 hour						
116.sgy	0038	116	0.4	0.3m	SOL	116	HDG: 358				
116.sgy	1856	1891			EOL	116					
116.sgy		1892			Noise Test						
PC Date / Time set to correct local time											
201.sgy	0052	201	0.4	0.3m	SOL	201	HDG: 123				
201.sgy	0057	903			EOL	201	End due to large wave				
201.sgy		904			Noise Test						
a201.sgy	0100	201	0.4	0.3m	SOL	201A	HDG: 123				
201.sgy		202			Begin maneuvering to avoid obstacle on line						
201.sgy		820			Begin maneuvering to avoid obstacle on line						
201.sgy		1101			Incomplete data						
201.sgy	0107	1195			EOL	201A					
201.sgy		1196			Noise Test						
203.sgy	0110	203	0.4	0.3m	SOL	203	HDG: 303				
203.sgy		220			First good shot						
203.sgy		1547			Incomplete Record.						
203.sgy	0123	2176			EOL	203					
203.sgy		2177			Noise Test						
Continued on Page 2											

APPENDIX A
MARINE MAMMAL OBSERVER REPORT

**MARINE MAMMAL OBSERVATION REPORT
SAN LUIS RAY GEOPHYSICAL SURVEY
DANA POINT, CALIFORNIA**

Marine Mammal Observer Report

Vessel: R/V JAB

Captain: Brayton Pointner

Scientific Crew: Mark Legg, Doug Bowlus, Tim Norall, Ryan Switzer

Marine Mammal Observer: Chris Castillo

Date(s) of Survey: June 14, 2016

A geophysical survey offshore of Dana Point, California is being conducted in order to determine the boundaries of the offshore San Juan paleo-river channel seaward of Doheny State Beach. The acoustic source will consist of a small 300-joule boomer similar to sources used by the U.S. Geological Survey. To improve the signal quality and attenuate the water bottom multiple, a 24-channel high-resolution digital streamer hydrophone array will be used to collect signals returning from the seafloor. The survey will be conducted from just beyond the surf zone to about 3000 feet (ft) (0.6 miles) offshore and approximately 2500 ft (0.47 miles) alongshore.

The study required the use of sound producing instrumentation, requiring the presence of a marine mammal observer (MMO). The echo-sounder emits a low-frequency pulse of 200-800 Hz at 0.4-sec intervals, towed at a distance of 20-m from the vessel. The hydrophone streamer contained an array of 25 hydrophones, extending 40-m from the vessel. A pre-watch duration of 5-10 minutes and an exclusion zone, radius from the “boomer,” of 150-m were set as the parameters for operation of the echo-sounder. Any sightings of cetaceans within those parameters meant a delay or shut-down of sound production. Such delays or shut-downs, in the presence of pinnipeds, were at the discretion of the MMO and depended upon the behavior of the animal(s). Any signs of distress were cause for a shut-down.

Ten transect lines were surveyed along the coastline of Dana Point, including the area south of the mouth of San Juan Creek. Marine mammals most likely to be encountered in the near-shore area were California sea lions (*Zalophus californianus*), Harbor seals (*Phoca vitulina*), Bottlenose dolphin (*Tursiops truncatus*), Common dolphin (*Delphinus* spp.), and Gray whales (*Eschrichtius robustus*). During this time of year, Gray whales on their northward migration are often seen with calves. In this survey, the only listed marine mammal seen was the Harbor seals (*Phoca vitulina*). Because of the extremely short duration of this cruise (3 hours 3 minutes) only three sightings occurred, and no sighting occurred during operation of the acoustic source.

The results of the Marine Mammal Observer report are described below. Daily field log reports are found in Table A-1.

Survey Date: 14 June 2016

Conditions: clear skies; 68° F; wind 0-5 knots from the SW; swell ~3' @ 14s; Beaufort 1.

Time	Observation/ Vessel Activity
13:50	Meeting and mobilization at the loading dock in Dana Point Harbor
16:44	Vessel underway
16:56	Two Harbor seals resting on red buoy.
16:58	Harbor seal fin and tail observed while in transit 20 m SW of vessel.
17:18	Pre-watch started while the hydrophone streamer and boomer sled were deployed
17:38	Ramp-up of boomer not possible, at lowest power setting. 40 minutes since last sighting
19:40	No marine mammals seen during acquisition
19:45	Immediately following the shutdown of the acoustic source a harbor seal surfaced less than 1m from the source. Four people were on deck for several minutes before the shutdown, but nobody observed the seal until after the shutdown. The harbor seal seemed interested in the source.
19:56	Return to dock begin demobilization
20:20	Demobilization complete

Sighting 1: 16:56

2 Harbor Seals (*Phoca vitulina*) –

Two Harbor seals resting on a red buoy. Approximately 30m away at a bearing position of 130. Harbor seals appeared unaffected and no mitigation was taken or required because the survey had not yet begun and the survey location had not yet been reached.

Direction of travel: Stationary

Total animals: 2

Distance when first observed: 30m

Closest distance to the vessel: 30m

Mitigation action: None taken (outside of exclusion zone)

Sighting 2: 16:58

1 Harbor Seal (*Phoca vitulina*) –

Harbor seal fin and tail observed while in transit 20 m SW of vessel, at a bearing position of 20. Harbor seal appeared unaffected and no mitigation was taken or required because survey activities had not yet begun, and the survey location had not yet been reached.

Direction of travel: Southwest

Total animals: 1

Distance when first observed: 20m

Closest distance to the vessel: 20m

Mitigation action: None taken (Survey equipment not in use, not at the survey location)

Sighting 3: 19:45

1 Harbor Seal (*Phoca vitulina*) –

Immediately following the shutdown of the acoustic source, a harbor seal surfaced less than 1m from the source at a bearing of 330. Four people were on deck for several minutes before the shutdown, but nobody observed the seal until after the shutdown. Harbor seal appeared unaffected and no mitigation was taken or required because the equipment had already been shut down.

Direction of travel: North

Total animals: 1

Distance when first observed: 1m

Closest distance to the vessel: 1m

Mitigation action: None taken (equipment shut down)

Table A-1. Marine mammal sightings for 14 June 2016.

Sighting No.	Time (PDT)	Bearing	Dist. From Source (m)	Vessel Activity	Species	No. of Animals Observed	Direction of Travel	Behavior
1	16:56	130	30	Transit, source off	Harbor Seal	2	Stationary	Resting on bouy
2	16:58	20	15	Transit, source off	Harbor Seal	1	SW	Fin and tail out of water, then disappeared
3	19:45	330	<1	Shutdown	Harbor Seal	1	N	Emerged upon shutdown

APPENDIX B

EXHIBIT H

EXHIBIT H

Mitigation Monitoring Program

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) and Initials
<i>Air Quality and Greenhouse Gas (GHG) Emissions (MND Section 3.3.3)</i>						
MM AIR-1: Engine Tuning, Engine Certification, and Fuels. The following measures will be required to be implemented by all Permittees under the Offshore Geophysical Permit Program (OGPP), as applicable depending on the county offshore which a survey is being conducted. Pursuant to section 93118.5 of CARB's Airborne Toxic Control Measures, the Tier 2 engine requirement applies only to diesel-fueled vessels.	All Counties: Maintain all construction equipment in proper tune according to manufacturers' specifications; fuel all off-road and portable diesel-powered equipment with California Air Resources Board (CARB)-certified motor vehicle diesel fuel limiting sulfur content to 15 parts per million or less (CARB Diesel).	Daily emissions of criteria pollutants during survey activities are minimized.	Determine engine certification of vessel engines. Review engine emissions data to assess compliance, determine if changes in tuning or fuel are required.	OGPP permit holder and contract vessel operator; California State Lands Commission (CSLC) review of Final Monitoring Report.	Prior to, during, and after survey activities. Submit Final Monitoring Report after completion of survey activities.	N/A- exempt-gasoline vessel
	Los Angeles and Orange Counties: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner; the survey shall be operated such that daily NOx emissions do not exceed 100 pounds based on engine certification emission factors. This can be accomplished with Tier 2 engines if daily fuel use is 585 gallons or less, and with Tier 3 engines if daily fuel use is 935 gallons or less		Verify that Tier 2 or cleaner engines are being used. Calculate daily NOx emissions to verify compliance with limitations.			N/A- exempt-gasoline vessel
	San Luis Obispo County: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner, accomplished with Tier 2 engines if daily fuel use is 585 gallons or less; all diesel equipment shall not idle for more than 5 minutes; engine use needed to maintain position in the water is not considered idling; diesel idling within 300 meters (1,000 feet) of sensitive receptors is not permitted; use alternatively fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane or biodiesel.		Verify that Tier 2 or cleaner engines are being used. Inform vessel operator(s) of idling limitation. Investigate availability of alternative fuels			N/A- exempt-gasoline vessel
	Santa Barbara County: Use vessel engines meeting CARB's Tier 2-certified engines or cleaner, accomplished with Tier 2 engines if daily fuel use is 790 gallons or less.		Verify that Tier 2 or cleaner engines are being used. Investigate availability of alternative fuels			N/A- exempt-gasoline vessel
	Ventura County: Use alternatively fueled construction equipment on site where feasible, such as compressed natural gas, liquefied natural gas, propane or biodiesel.		Investigate availability of alternative fuels.			N/A- exempt-gasoline vessel

Geophysical Survey Offshore of Dana Point, California
Field Operations Report

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) & Initials
MM BIO-1: Marine Mammal and Sea Turtle Presence – Current Information.	All State waters; prior to commencement of survey operations, the geophysical operator shall: (1) contact the National Oceanic and Atmospheric Administration Long Beach office staff and local whale-watching operations and shall acquire information on the current composition and relative abundance of marine wildlife offshore, and (2) convey sightings data to the vessel operator and crew, survey party chief, and onboard Marine Wildlife Monitors (MWMs) prior to departure. This information will aid the MWMs by providing data on the approximate number and types of organisms that may be in the area.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document contact with appropriate sources. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; Inquiry to NOAA and local whale watching operators.	Prior to Survey	EC 5/27/16
MM BIO-2: Marine Wildlife Monitors (MWMs).	Except as provided in section 7(h) of the General Permit, a minimum of two (2) qualified MWMs who are experienced in marine wildlife observations shall be onboard the survey vessel throughout both transit and data collection activities. The specific monitoring, observation, and data collection responsibilities shall be identified in the Marine Wildlife Contingency Plan required as part of all Offshore Geophysical Permit Program permits. Qualifications of proposed MWMs shall be submitted to the National Oceanic and Atmospheric Administration (NOAA) and CSLC at least twenty-one (21) days in advance of the survey for their approval by the agencies. Survey operations shall not commence until the CSLC approves the MWMs.	Competent and professional monitoring or marine mammals and sea turtles; compliance with established monitoring policies.	Document contact with and approval by appropriate agencies. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	EC 5/27/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) & Initials												
MM BIO-3: Safety Zone Monitoring.	Onboard Marine Wildlife Monitors (MWMs) responsible for observations during vessel transit shall be responsible for monitoring during the survey equipment operations. All visual monitoring shall occur from the highest practical vantage point aboard the survey vessel; binoculars shall be used to observe the surrounding area, as appropriate. The MWMs will survey an area (i.e., safety or exclusion zone) based on the equipment used, centered on the sound source (i.e., vessel, towfish), throughout time that the survey equipment is operating. Safety zone radial distances, by equipment type, include:	No adverse effects to marine mammals or sea turtles due to survey activities are observed; compliance with established safety zones.	Compliance with permit requirements (observers); compliance with established safety zones. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	CC 6/14/16												
	<table><tr><th>Equipment Type</th><th>Safety Zone (radius, m)</th></tr><tr><td>Single Beam Echosounder</td><td>50</td></tr><tr><td>Multibeam Echosounder</td><td>500</td></tr><tr><td>Side-Scan Sonar</td><td>600</td></tr><tr><td>Subbottom Profiler</td><td>100</td></tr><tr><td>Boomer System</td><td>100</td></tr></table>						Equipment Type	Safety Zone (radius, m)	Single Beam Echosounder	50	Multibeam Echosounder	500	Side-Scan Sonar	600	Subbottom Profiler	100	Boomer System	100
	Equipment Type						Safety Zone (radius, m)											
	Single Beam Echosounder						50											
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Boomer System	100																	
If the geophysical survey equipment is operated at or above a frequency of 200 kilohertz (kHz), safety zone monitoring and enforcement is not required; however, if geophysical survey equipment operated at a frequency at or above 200 kHz is used simultaneously with geophysical survey equipment less than 200 kHz, then the safety zone for the equipment less than 200 kHz must be monitored. The onboard MWMs shall have authority to stop operations if a mammal or turtle is observed within the specified safety zone and may be negatively affected by survey activities. The MWMs shall also have authority to recommend continuation (or cessation) of operations during periods of limited visibility (i.e., fog, rain) based on the observed abundance of marine wildlife.																		

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) & Initials
MM BIO-3: Safety Zone Monitoring.	Periodic reevaluation of weather conditions and reassessment of the continuation/cessation recommendation shall be completed by the onboard MWMs. During operations, if an animal's actions are observed to be irregular, the monitor shall have authority to recommend that equipment be shut down until the animal moves further away from the sound source. If irregular behavior is observed, the equipment shall be shut-off and will be restarted and ramped-up to full power, as applicable, or will not be started until the animal(s) is/are outside of the safety zone or have not been observed for 15 minutes. For nearshore survey operations utilizing vessels that lack the personnel capacity to hold two (2) MWMs aboard during survey operations, at least twenty-one (21) days prior to the commencement of survey activities, the Permittee may petition the CSLC to conduct survey operations with one (1) MWM aboard. The CSLC will consider such authorization on a case-by-case basis and factors the CSLC will consider will include the timing, type, and location of the survey, the size of the vessel, and the availability of alternate vessels for conducting the proposed survey. CSLC authorizations under this subsection will be limited to individual surveys and under any such authorization; the Permittee shall update the MWCP to reflect how survey operations will occur under the authorization.	No adverse effects to marine mammals or sea turtles due to survey activities are observed; compliance with established safety zones.	Compliance with permit requirements (observers); compliance with established safety zones. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Prior to survey.	CC 6/14/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) & Initials
MM BIO-4: Limits on Nighttime OGPP Surveys.	All State waters; nighttime survey operations are prohibited under the OGPP, except as provided below. The CSLC will consider the use of single beam echosounders and passive equipment types at night on a case-by-case basis, taking into consideration the equipment specifications, location, timing, and duration of survey activity.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Presurvey request for nighttime operations, including equipment specifications and proposed use schedule. Document equipment use. Submit Final Monitoring Report after completion of survey activities	OGPP permit holder.	Approval required before survey is initiated. Monitoring Report following completion of survey.	CC 6/14/16
MM BIO-5: Soft Start.	All State waters; the survey operator shall use a “soft start” technique at the beginning of survey activities each day (or following a shut down) to allow any marine mammal that may be in the immediate area to leave before the sound sources reach full energy. Surveys shall not commence at nighttime or when the safety zone cannot be effectively monitored. Operators shall initiate each piece of equipment at the lowest practical sound level, increasing output in such a manner as to increase in steps not exceeding approximately 6 decibels (dB) per 5- minute period. During ramp-up, the Marine Wildlife Monitors (MWMs) shall monitor the safety zone. If marine mammals are sighted within or about to enter the safety zone, a power-down or shut down shall be implemented as though the equipment was operating at full power. Initiation of ramp-up procedures from shut down requires that the MWMs be able to visually observe the full safety zone.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Compliance with permit requirements (observers); compliance with safe start procedures. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Immediately prior to survey.	TN 06/14/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) & Initials
MM BIO-6: Practical Limitations on Equipment Use and Adherence to Equipment Manufacturer's Routine Maintenance Schedule.	All State waters; geophysical operators shall follow, to the maximum extent possible, the guidelines of Zykov (2013) as they pertain to the use of subbottom profilers and sidescan sonar, including: • Using the highest frequency band possible for the subbottom profiler; • Using the shortest possible pulse length; and • Lowering the pulse rate (pings per second) as much as feasible. Geophysical operators shall consider the potential applicability of these measures to other equipment types (e.g., boomer). Permit holders will conduct routine inspection and maintenance of acoustic-generating equipment to ensure that low energy geophysical equipment used during permitted survey activities remains in proper working order and within manufacturer's equipment specifications. Verification of the date and occurrence of such equipment inspection and maintenance shall be provided in the required presurvey notification to CSLC.	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Document initial and during survey equipment settings. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Immediately prior to and during survey.	HW 5/28/16
MM BIO-7: Avoidance of Pinniped Haul-Out Sites.	The Marine Wildlife Contingency Plan (MWCP) developed and implemented for each survey shall include identification of haul-out sites within or immediately adjacent to the proposed survey area. For surveys within 300 meters (m) of a haul-out site, the MWCP shall further require that: • The survey vessel shall not approach within 91 m of a haul-out site, consistent with National Marine Fisheries Service (NMFS) guidelines; • Survey activity close to haul-out sites shall be conducted in an expedited manner to minimize the potential for disturbance of pinnipeds on land; and • Marine Wildlife Monitors shall monitor pinniped activity onshore as the vessel approaches, observing and reporting on the number of pinnipeds potentially disturbed (e.g., via head lifting, flushing into the water). The purpose of such reporting is to provide CSLC and California Department of Fish and Wildlife (CDFW) with information regarding potential	No adverse effects to pinnipeds at haul outs are observed.	Document pinniped reactions to vessel presence and equipment use. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Monitoring Report following completion of survey	CC 6/14/16

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) & Initials
MM BIO-8: Reporting Requirements – Collision.	<p>All State waters; if a collision with marine mammal or reptile occurs, the vessel operator shall document the conditions under which the accident occurred, describing:</p> <ul style="list-style-type: none"> • Vessel location (lat., long.) when collision occurred; • Date and time of collision; • Speed and heading of the vessel at the time of collision; • Observation conditions (e.g., wind speed & direction, swell height, visibility in miles or kilometers, and presence of rain or fog) at time of collision; • Species of marine wildlife contacted (if known); • If an MWM or MMO was onboard; • Vessel name, vessel owner/operator, & captain officer in charge of the vessel at time of collision. After a collision, the vessel shall stop, if safe to do so; however, the vessel is not obligated to stand by and may proceed after confirming that it will not further damage the animal by doing so. The vessel must immediately communicate by radio or telephone all details to the vessel's base of operations, and shall report the incident. Consistent with Marine Mammal Protection Act requirements, the vessel's base of operations or, if an onboard telephone is available, the vessel captain him/herself, will then immediately call the National Oceanic and Atmospheric Administration (NOAA) Stranding Coordinator to report the collision and follow any subsequent instructions. From the report, the Stranding Coordinator will coordinate subsequent action, including enlisting the aid of marine mammal rescue organizations, if appropriate. From the vessel's base of operations, a telephone call will be placed to the Stranding Coordinator, NOAA National Marine Fisheries Service (NMFS), Southwest Region, Long Beach, to obtain instructions. Although NOAA has primary responsibility for marine mammals in both State and Federal waters, the California Department of Fish and Wildlife (CDFW) will also be advised that an incident has occurred in State waters affecting a protected species. 	No adverse effects to marine mammals or sea turtles due to survey activities are observed.	Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder.	Monitoring Report following completion of survey.	N/A No Collisions Reported 06/14/16

Geophysical Survey Offshore of Dana Point, California
Field Operations Report

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) & Initials
MM BIO-9: Limitations on Survey Operations in Select Marine Protected Areas (MPAs).	All MPAs; prior to commencing survey activities, geophysical operators shall coordinate with the CLSC, California Department of Fish and Wildlife (CDFW), and any other appropriate permitting agency regarding proposed operations within MPAs. The scope and purpose of each survey proposed within a MPA shall be defined by the permit holder, and the applicability of the survey to the allowable MPA activities shall be delineated by the permit holder. If deemed necessary by CDFW, geophysical operators will pursue a scientific collecting permit, or other appropriate authorization, to secure approval to work within a MPA, and shall provide a copy of such authorization to the CSLC as part of the required presurvey notification to CSLC. CSLC, CDFW, and/or other permitting agencies may impose further restrictions on survey activities as conditions of approval	No adverse effects to MPA resources due to survey activities are observed.	Monitor reactions of wildlife to survey operations; report on shutdown conditions and survey restart. Submit Final Monitoring Report after completion of survey activities.	OGPP permit holder; survey permitted by CDFW.	Prior to survey.	N/A No MPAs in project area
MM HAZ-1: Oil Spill Contingency Plan (OSCP) Required Information.	Permittees shall develop and submit to CSLC staff for review and approval an OSCP that addresses accidental releases of petroleum and/or non-petroleum products during survey operations. Permittees' OSCPs shall include the following information for each vessel to be involved with the survey: <ul style="list-style-type: none"> • Specific steps to be taken in the event of a spill, including notification names, phone numbers, and locations of: (1) nearby emergency medical facilities, and (2) wildlife rescue/response organizations (e.g., Oiled Wildlife Care Network); • Description of crew training and equipment testing procedures; and • Description, quantities, and location of spill response equipment onboard the vessel. 	Reduction in the potential for an accidental spill. Proper and timely response and notification of responsible parties in the event of a spill.	Documentation of proper spill training. Notification of responsible parties in the event of a spill.	OGPP permit holder and contract vessel operator.	Prior to survey.	HE 5/27/16

Geophysical Survey Offshore of Dana Point, California
Field Operations Report

Mitigation Measure (MM)	Location and Scope of Mitigation	Effectiveness Criteria	Monitoring or Reporting Action	Responsible Party	Timing	Implementation Date(s) & Initials
MM HAZ-2: Vessel fueling restrictions.	Vessel fueling shall only occur at an approved docking facility. No cross vessel fueling shall be allowed.	Reduction in the potential for an accidental spill.	Documentation of fueling activities.	Contract vessel operator.	Following survey.	N/A- boat is trailered and fuels on land
MM HAZ-3: OSCP equipment and supplies.	Onboard spill response equipment and supplies shall be sufficient to contain and recover the worst-case scenario spill of petroleum products as outlined in the OSCP.	Proper and timely response in the event of a spill.	Notification to CSLC of onboard spill response equipment/supplies inventory, verify ability to respond to worst-case spill.	Contract vessel operator.	Prior to survey.	HE 5/27/16- supplies confirmed
MM HAZ-1: (OSCP) Required Information.	Outlined under Hazards and Hazardous Materials (above)					HE 5/27/16
MM HAZ-2: Vessel fueling restrictions.	Outlined under Hazards and Hazardous Materials (above)					N/A- boat is trailered and fuels on land
MM HAZ-3: OSCP equipment and supplies.	Outlined under Hazards and Hazardous Materials (above)					HE 5/27/16
MM BIO-9: Limitations on Survey Operations in Select MPAs.	Outlined under Biological Resources (above)					N/A No MPAs
MM REC-1: U.S. Coast Guard (USCG), Harbormaster, and Dive Shop Operator Notification.	All California waters where recreational diving may occur; as a survey permit condition, the CSLC shall require Permittees to provide the USCG with survey details, including information on vessel types, survey locations, times, contact information, and other details of activities that may pose a hazard to divers so that USCG can include the information in the Local Notice to Mariners, advising vessels to avoid potential hazards near survey areas. Furthermore, at least twenty-one (21) days in advance of in-water activities, Permittees shall: (1) post such notices in the harbormasters' offices of regional harbors; and (2) notify operators of dive shops in coastal locations adjacent to the proposed offshore survey operations.	No adverse effects to recreational divers from survey operations.	Notify the USCG, local harbormasters, and local dive shops of planned survey activity. Submit Final Monitoring Report after completion of survey activities.	OGPP Permit holder.	Prior to survey.	AJ 5/28/16